



WHAT IS CLAIMED IS:

- 1-21. (withdrawn)
- 22-42. (cancelled)
43. (added) A printed circuit board capable of accepting a heat-generating electronic component, comprising:
  - a) a substrate having a signal layer on at least a portion of a first surface of said substrate;
  - b) a metal ground layer adjacent at least a portion of a second surface of said substrate;
  - c) a heat sink layer;
  - d) a bonding layer for affixing said heat sink layer to said metal ground layer and, where said metal ground layer is not coextensive with said substrate, for affixing said heat sink layer to said second surface of said substrate;
  - e) a void formed in said substrate, including in said signal layer and in said ground layer, said void sized to accept the heat-generating electronic component;
  - f) a through-hole formed in said substrate, including in said signal layer and in said metal ground layer, said through-hole continuing through said bonding layer and at least partially into said heat sink layer;
  - g) wherein said through-hole is partially plated with conductive plating to place said heat sink layer and said metal ground layer in electrical and thermal communication and wherein said through-hole is further filled with non-conductive filler to maintain electrical isolation between said metal ground layer and said signal layer.

44. (added) The printed circuit board of claim 43 wherein said bonding layer comprises epoxy.
45. (added) The printed circuit board of claim 43 wherein said heat sink layer is selected from a group consisting of copper, brass and aluminum.
46. (added) The printed circuit board of claim 43 wherein said heat sink layer is coextensive with said substrate.
47. (added) The printed circuit board of claim 43 wherein said heat sink layer is not coextensive with said substrate and is smaller than said substrate.
48. (added) The printed circuit board of claim 43 wherein said through-hole extends completely through said heat sink layer.
- 49 (added) A printed circuit board heat sink connection comprising:
- a) a multilayer circuit board further comprising:
    - i) a substrate having a signal layer formed on a first surface of said substrate;
    - ii) a metal ground layer adjacent at least a portion of a second surface of said substrate;
    - iii) a heat sink layer; and
    - iv) a bonding layer connecting said heat sink layer to said metal ground layer and, where said metal ground layer is not coextensive with said substrate, connecting said heat sink layer to said second surface of said substrate;
  - b) a through-hole formed in said multilayer circuit board;
  - c) wherein said through-hole extends through said signal layer, said substrate, said bonding layer and said ground layer and only partially extends through said heat sink layer;

- d) wherein said through-hole is partially filled with conductive filler such that said conductive filler fills that portion of said through-hole adjacent said heat sink layer, said bonding layer, and said metal ground layer;
  - e) wherein the portion of said through-hole not filled with conductive filler is filled with non-conductive filler such that said metal ground layer and said signal layer are not in electrical communication.
50. (added) The printed circuit board heat sink connection of claim 49 wherein said heat sink layer is comprised of material selected from the group consisting of copper, brass and aluminum.
51. (added) The printed circuit board heat sink connection of claim 49 wherein said non-conductive filler is selected from the group consisting of polyimide resin, epichloridehydrin bisphenol-A resin and bismaleimidetriazine resin.
52. (added) The printed circuit board heat sink connection of claim 51 wherein said nonconductive filler contains additives selected from the group consisting of polyphenylene, polyphenylene stearate and polyether imide.
53. (added) The printed circuit board heat sink connection of claim 49 wherein said heat sink layer is coextensive with said substrate.
54. (added) The printed circuit board heat sink connection of claim 49 wherein said heat sink layer is not coextensive with and is smaller than said substrate.
55. (added) The printed circuit board heat sink connection of claim 49 wherein said through-hole extends completely through said heat sink layer.

56. (added) An electronic integrated circuit device comprising:
- a) a printed circuit board further comprising:
    - i) a substrate having a signal layer on at least a portion of a first surface of said substrate;
    - ii) a metal ground layer adjacent at least a portion of a second surface of said substrate;
    - iii) a heat sink layer;
    - iv) a bonding layer for affixing said heat sink layer to said metal ground layer and, where said ground layer is not co-extensive with said substrate, to said second surface of said substrate;
    - v) a void formed in said substrate, including said signal layer, said ground layer and said bonding layer;
    - vi) a through-hole formed in said substrate, including said signal layer and said metal ground layer and continuing through said epoxy layer and partially into said heat sink layer;
    - vii) which through-hole is partially plated with conductive plating to place said heat sink layer and said ground layer in electrical and thermal communication and which through-hole is further filled with non-conductive filler to electrically isolate said ground layer from said signal layer;
  - b) a heat-generating electronic component having a contact surface;
  - c) wherein said void is sized to accept said heat-generating electronic component and wherein said component is mounted in said void;

d) wherein said component's contact surface is connected to said heat sink layer using solder.

57. (added) The electronic integrated circuit device of claim 56 wherein said bonding layer comprises epoxy.

58. (added) The electronic integrated circuit device of claim 56 wherein said conductive plating is selected from the group consisting of copper, silver, chrome, aluminum, gold, beryllium and their alloys.

59. (added) The electronic integrated circuit device of claim 56 wherein said nonconductive filler is selected from the group consisting of polyimide resin, epichloridehydrin bisphenol-A resin and bismaleimidetriazine resin.

60. (added) The printed circuit board heat sink connection of claim 59 wherein said nonconductive filler contains additives selected from the group consisting of polyphenylene, polyphenylene stearate and polyether imide.

61. (added) The electronic integrated circuit device of claim 59 wherein said heat sink layer comprises material selected from the group consisting of copper, brass and aluminum.

62. (added) The electronic integrated circuit device of claim 56 wherein said through-hole extends completely through said heat sink layer.